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July 27th.

Vice-President BRIDGES in the Chair.

The Committee to which was referred Dr. Wetherill's paper on the Phoenixville Molybdate of Lead, reported in favor of publication in the Proceedings.

Further Examination of the Phoenixville Molybdate of Lead.

By CHARLES M. WETHERILL, Ph. D.

In the Proceedings for the 30th March of this year, is a description of a red variety of Molybdate of Lead, examined qualitatively by me, and in which it is stated that I could not detect chromium either by the moist way, or before the blow pipe. In the July number of Silliman's Journal, page 105, among the mineralogical notices by Mr. W. T. Blake, he observes that the specimens from the Wheatley mine, which he mistook for chromate of lead, have been found to be the molybdate containing chromic acid. I find also in Dana's Mineralogy, under the head of this mineral, the observation that "a red variety contains a few per cent. of chromic acid." In my former analysis I looked particularly for this acid without finding it. Supposing that Mr. Blake had been more fortunate than myself, I repeated the examination on larger quantities of mineral, and with great care, but have no reason to change what was before written. About one decigramme of the pulverized molybdate was dissolved in boiling concentrated hydrochloric acid. No chlorine could be detected, as would have been the case were chromic acid present. After boiling for some time to reduce the hypothetical acid to sesquioxide of chromium, enough water was added to dissolve the formed chloride of lead, and then sulphuric acid in excess. The solution was yellow, and when drops of the liquid had reached the hot sides of the capsule the blue molybdenum compound was formed, which gave with the yellow solution a green tinge to those parts. The lead being thus separated in combination with sulphuric acid, to the filtrate was added hydrosulphuret of ammonium, which kept in solution the sulphuret of molybdenum thus formed, and precipitated sulphuret of iron, which should contain sesquioxide of chromium, if chromic acid were in the mineral. This sulphuret of iron was removed from the solution, oxidized by nitric acid, precipitated hot by ammonia, then washed, and the ashes of the filter fused with nitre and carbonate of soda. The result was the slightest shade greenish, as if from the presence of minute traces of manganese, but not in the least yellow, nor did it give a yellow solution with water, nor did the solution, neutralized exactly by ammonia and nitric acid, give, as would be the case with chromic acid, the purple red precipitate of the chromate of silver on addition of the nitrate. The reactions of chromium are so decided that the presence of this metal could hardly escape the notice of one looking for it. I have not yet been able to obtain a sufficient quantity of the mineral for a quantitative examination. This compound may possibly be an acid molybdate, analogous to many chromates which when neutral are yellow, and red when acid.

The Committee on the following paper by Dr. Wetherill, reported in favor of publication in the Proceedings.

Chemical Examination of the Food of the Queen Bee.

By CHARLES M. WETHERILL, Ph. D.

A specimen was given to me by Dr. Leidy, from Mr. Langstroth, of the food of the queen bee. It was an oblong mass, consisting of two differently colored layers, the inner one horn-like and transparent, the outer whitish and more opaque. Under the microscope, with high powers, it appears amorphous. It was

heavier than water, of the consistency of wax, but sticky and elastic. It contains wax, which is in larger quantity in the white than in the inner layer. Heated on the platinum foil a portion of the body melts and flows to another part of the platinum, where by further heating it diffuses the odor of wax. The residue does not melt, but swells up by greater heat, with a smell of burned leather, and leaves a porous coke, burning off with great difficulty, and with a slight ash. The substance in warm water is softened and partly dissolves, leaving white insoluble flakes; the filtrate gives a precipitate on boiling, which precipitate does not melt by heat, nor is it soluble in alcohol or ether. The original substance does not dissolve in alcohol or ether, but in the latter menstruum is covered on the surface with a white coating. In warm dilute hydrochloric acid it is slightly attacked, but not completely dissolved. Tested for nitrogen by Lassaigne's method, by fusion with sodium and obtaining the precipitate of Prussian blue, it indicated the presence of considerable quantities of that element. As the body appears to be composed of at least three substances, and the quantity at my disposal weighed but three decigrammes, I was unable to subject it to an ultimate analysis.

From its reactions it appears to contain, besides wax, albumen and protein compounds. It is truly a bread containing albuminous compounds, which would probably prove, on analysis, similar to the gluten of wheat, for the nourishment of the plastic organs of the body. The examination of this substance was interesting in connection with the Mexican ant honey. The latter contains no nitrogen, and would therefore seem incapable alone of affording nourishment to the young insect, as supposed by some, and which young, in the case of bees, are fed by pollen. Perhaps the accumulation of honey in the ant is the result of a disease like diabetes; though it would seem improbable that it should be a disease so widely diffused. These ants do not, I suppose, make wax or an analogous substance, which is the use of the honey of the bee.

The examination of compounds occurring in the lower animals, which are also the result of the decomposition of amylaceous and albuminous substances, and a comparison of these compounds with the animal's food, has been much neglected by chemists. Yet it would seem that the study of certain decompositions deemed physiologically important, could be more readily carried out upon those lower orders whose organs are less complex. The food of animals is in general very similar, as well in the percentage proportion of its constituents as in the rational formulæ of its elements. It consists, as is well known, of nitrogenized compounds for formation, and amylaceous ones for respiration. The amylaceous compounds, in particular, have been well studied in all their transformations out of the body, and to a certain extent as occurring in man and in a few animals. The three principal radicals of this class, amyl, ethyl, and formyl, and their compounds and derivatives, are well known. It is therefore significant, and suggestive of further research, when we find the three acids of their alcohol radicals in the animal, as valerianic in the oil of *Delphinus globiceps*, acetic in man, &c., and formic in the ant; these acids and other products of decomposition of the three radicals being besides found in other animals and in plants, and some in a diseased state of plant or animal. If it be desirable to study that mysterious force, the vital, how can it be done but by its effects, for which nature must be cross-examined in her every form. This is the more important, as we find vitality to determine the resolution of the same food into different products in different animals, as may be required for their existence. We have a beautiful example of this in the case of the bee. One of the simplest transformations of an organic compound is that of cane to grape sugar; it requires merely the absorption of two equivalents of water by the former. Grape sugar appears by the phenomena of fermentation to be more readily decomposable than cane sugar; and we accordingly find this change taking place in the body of the bee in the formation of its honey, which is to be worked up again into wax. When cane sugar is given to bees for the formation of wax, wax is indeed formed, but apparently with more difficulty, and does not detach itself readily as in wax from honey. This excrement of honey compared with food is probably the simplest occurring in animal life.

The relation of food to respiration and nourishment in man and kindred animals has been well set forth by Liebig in his *Animal Chemistry*. According to this author, an equivalent of starch is changed into fat by losing one equivalent of carbonic acid, and seven equivalents of oxygen. Now, since wax bears a great analogy to the fats, it may be supposed to be derived from honey in a similar manner. Wax composed of cerine and myricine has a composition of $C_{34}H_{34}O_2$; anhydrous grape sugar $C_{12}H_{12}O_{12}$, or three equivalents $C_{36}H_{36}O_{36}$, two equivalents carbonic acid, two of water, and twenty-eight oxygen; three equivalents of grape sugar would yield one of wax. That wax is produced from honey is shown by Grundlach, (*Natural History of Bees*,) as quoted by Liebig. The air in the hive during the formation of wax should contain an excess of oxygen, which has not been shown by analysis, that I am aware of.

Grundlach supposes that honey is alone necessary to the support of bees without nitrogenized substances like pollen, and instances the fact that bees often starve in April when their honey is consumed, and when they can obtain pollen from the fields, but no honey. But this, perhaps, only proves that much honey is necessary to their existence, owing no doubt to the large expenditure in the formation of wax, and which is not voluntary but continually going on. For the same author has observed that bees shut up and fed without a queen, will not build up honey comb, although the wax laminae will continue to be secreted from their bodies. If there is any analogy between bees and the vertebrata, that nitrogenized compounds are as necessary to the formation of the plastic organs as the non-nitrogenized are to the respiration, (and it would seem thus probable from the fact that the queen bee, the fruit of whose labor requires much nitrogen, lives on highly nitrogenized food,) it seems as incredible that bees should be supported entirely by honey, as that man should be by starch only.

A careful examination of the relation between food and its transformation in the bodies of such animals, would no doubt throw great light upon mooted points in physiology; and the many differences in the nature of the products, which could no doubt be reconciled with the laws of chemistry, would in themselves afford one of the strongest proofs in favor of the theories with which they might agree.

The Committee on Dr. Genth's paper, describing a new Mineral, reported in favor of publication in the *Proceedings*.

On Rhodophyllite, a New Mineral.

By DR. F. A. GENTH.

Primitive form most probably hexagonal; sometimes small six-sided laminae. Cleavage basal, eminent. Usually in masses consisting of foliated scales.

H = 2.5. Sp. gr. (at 77° F.) = 2.617.

Color of fine scales between greyish and silver-white and peach-blossom red; masses of the latter color. Streak reddish white. Lustre pearly. Subtransparent; subtranslucent. Scales flexible, but not elastic. The powder greasy to the touch.

Yields water in the matrass. Heated before the blowpipe, it becomes silver-white, with a greyish-green tint; small scales are rounded at the edges, and become brownish from the oxidation of the iron; dissolves in borax and microcosmic salt, and gives in both flames emerald green beads; by the latter reagent a skeleton of silicic acid is separated; with soda in the oxidizing flame it forms a yellow mass. Hydrochloric acid apparently does not act upon it; sulphuric acid acts slowly upon the fine powder, but the mineral previously heated to redness is almost completely decomposed by it, with separation of silicic acid as a jelly.

Composition : $3 (RO, SiO_3) + 2 (R_2O_3, SiO_3) + 9 (MgO, HO)$ According to analysis it contains :

Silicic acid	= 33.41 . . 32.98	contains oxygen	17.12
Sesquioxide of chromium }	6.85	"	2.12
Alumina	= 18.15 . . 11.11	"	5.19
Oxide of iron	1.43	"	0.32
Oxide of nickel	trace		
Magnesia	= 35.86 . . 35.22	"	14.08
Lime	trace		
Lithia			
Soda	= 0.28 . . 0.28	"	0.11
Potash	= 0.10 . . 0.10	"	0.02
Water	= 12.79 . . 13.12	"	11.66
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	100.59	101.09	

Found near Texas in Lancaster county, associated with chromic iron, gymnite, nickel-gymnite and other minerals.

Considering sesquioxide of chromium and alumina as isomorphous bases, and in the same manner oxide of iron and the small quantities of alkalis isomorphous with magnesia, the oxygen ratio of

$$\begin{aligned} RO : R_2O_3 : SiO_3 : HO & \text{ is } \\ 14.53 : 7.31 : 17.12 : 11.66, \\ = 1.99 : 1 : 2.34 : 1.6, & \text{ which is very near } \\ = 1 : \frac{2}{3} : \frac{5}{4} : \frac{3}{2}, & \text{ and gives the equivalents} \end{aligned}$$

in the following proportion :

$$\begin{aligned} RO : R_2O_3 : SiO_3 : HO \\ 12 : 2 : 5 : 9, & \text{ or the formula—} \\ 3 (RO, SiO_3) + 2 (R_2O_3, SiO_3) + 9 (MgO, HO). \end{aligned}$$

In the chemo-mineralogical system, this mineral is to be placed among the *Silicates of bases* $RO + R_2O_3 + Hydrates$, and it has some relation to Chlorite and Ripidolite. Besides, most of its physical and chemical properties seem to be identical with Fiedler's Rhodochrom, a mineral from Tino in Greece and some localities in the Oural Mountains, which by G. Rose is considered a serpentine, containing a large quantity of chromium; but the latter has a greenish-black color, and dissolves in hydrochloric acid. As no quantitative analysis of it has been published, further examinations have to prove what relations exist between these minerals. I at least consider it useless to speak about identity, if it cannot be proved by analysis.

Another mineral, much resembling Rhodophyllite, but of a different composition, is Kammererite.

In the following I will give a brief report of the data of the analysis, and the modes which were adopted in separating the different ingredients.

I. 2.0490 grammes of the mineral gave :

Water	0.2689 grammes.
Silicic acid	0.6759 "
Sesquioxide of chromium	0.1403 "
Alumina	0.2277 "
Sesquioxide of iron	0.0327 "
Oxide of nickel	trace "
Pyrophosphate of magnesia	2.0084 "
Lime	trace "

II. 1.7406 grammes gave :

Chloride of lithium, sodium and potassium	0.0138 grammes.
Platinum	0.0036 "

III. 2.4806 grammes gave:

Silicic acid	0.8288 grammes.
Sesquioxide of iron	
“ chromium	}	0.4502 “
Alumina	
Pyrophosphate of magnesia	2.3499 “
Magnesia	0.0451 “

IV. 2.6148 grammes gave:

Water	0.3344 grammes.
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In analysis No. I. the fine powder was fused in a platinum crucible with carbonate of soda and nitrate of potash; the fused mass was decomposed by hydrochloric acid, and evaporated to dryness; the dry mass moistened with hydrochloric acid, heated and filtered. The silicic acid, thus separated, containing still a small quantity of chromium, etc., was fused a second time by carbonate of soda, and treated as above; the solution containing the small quantity of chromium was added to the other part. The acid liquid containing in solution the sesquioxides of chromium and iron, alumina and magnesia, was very nearly neutralized by carbonate of soda, and precipitated by carbonate of baryta. The mixture was often stirred, and after two days filtered. The weaker bases were completely precipitated, and did not contain a trace of magnesia. The precipitate of alumina, the sesquioxides of iron and chromium, and the excess of carbonate of baryta, were treated with sulphuric acid and the soluble sulphates filtered from the insoluble sulphate of baryta. The filtrate was precipitated by ammonia and boiled, to prevent the dissolution of sesquioxide of chromium. This precipitate, after having been filtered and dried, was finely powdered, and fused with carbonate of soda and nitrate of potash, in order to oxidize the sesquioxide of chromium into chromic acid. From the solution in water alumina was precipitated by carbonate of ammonia. The filtrate was then acidulated with hydrochloric acid, the chromic acid reduced by alcohol, and the sesquioxide of chromium precipitated from the boiling solution by ammonia.

After baryta had been separated by sulphuric acid from the filtrate of the weak bases, magnesia was precipitated from the ammoniacal solution by phosphate of ammonia, with the requisite precautions. In analysis No. III. I decomposed the finely powdered mineral (previously heated to redness) by evaporation with sulphuric acid. The silicic acid not having a white color, was fused with carbonate of soda and nitrate of potash as above, and the solution containing alumina, sesquioxides of chromium and iron, and magnesia added to the other parts. The sesquioxides were separated from magnesia by carbonate of baryta.

The solution containing the magnesia, from which baryta was separated by sulphuric acid, and to which an excess of chloride of ammonium had been added, gave with ammonia a white gelatinous precipitate, which was insoluble in caustic potash, but it gave the other reactions of magnesia. In analyzing this mineral I tried at first to separate magnesia from the sesquioxides by chloride of ammonium and ammonia, but although I had ounces of ammoniacal salts in solution, only half of the magnesia (17 per cent.) remained in solution. I dissolved and precipitated thus three times, but at last I had to give it up, and separated the balance which was remaining with the weak bases by carbonate of baryta. I never before had such difficulties in separating alumina from magnesia, and H. Rose, in his newest edition, is still in favor of this method, and separated the *small* quantity of magnesia, which always falls down with the alumina, by dissolving the latter in caustic potash. I shall make further experiments with the magnesia separated from Rhodophyllite, and intend to make communication of my results to the Academy, if I find them interesting enough.

For the estimation of the alkalies, the mineral, previously heated to redness, was decomposed by sulphuric acid, the soluble sulphates were boiled with carbonate of baryta, and the carbonates of the alkalies with traces of magnesia extracted by water. The solution was evaporated to dryness, dissolved and filtered from some magnesia which remained; but the last trace of it was separated by oxide of mercury after the carbonates were converted into chlorides.

The chlorides were weighed together, dissolved in water, and on the addition of bichloride of platinum evaporated to dryness, and the remaining double salt of bichloride of platinum and potassium extracted by alcohol. This salt was heated to redness (as its quantity was very small,) and the platinum separated by water from the chloride of potassium. From the quantity of platinum, that of potash and chloride of potassium was calculated, and the latter subtracted from the whole amount of alkali-metals. The difference is the weight of chloride of sodium and lithium, but their quantity is too small for a correct analysis. From reactions it was supposed that the mineral contained about equal proportions of those. Fluorine and phosphoric or boracic acid could not be detected.

ELECTION.

Mr. James L. Claghorn, of Philadelphia, Mr. George M. Keim, of Reading, Pennsylvania, and Dr. G. Bischoff, of the same place, were elected *Members*; and

Dr. Henry G. Dalton, of Demerara, was elected a *Correspondent*.

August 3d.

Vice-President BRIDGES in the chair.

A communication from Prof. S. F. Baird was read, stating that the *Vulpes Utah*, of Audubon and Bachman, described in the last No. of the Proceedings (for May and June) is identical with the *V. macrourus*, Baird, described in Capt. Stansbury's Report of the Exploration of Utah. As this Report was published early in June, the writer claims priority of date for the latter name.

Dr. LeConte read a paper intended for publication in the Proceedings, entitled "Remarks on the Coccinellidæ of the United States," which was referred to Dr. Watson, Dr. Hallowell and Mr. Kilvington.

Dr. LeConte read a second communication, also intended for publication, entitled "Description of a new species of Trombidium." Referred to the same Committee.

August 10th.

Vice-President BRIDGES in the Chair.

A letter was read from Dr. J. P. Heister, for Dr. Bischoff of Reading, Pennsylvania, dated August 5th, 1852, acknowledging the receipt of the notice of election of the latter as a member of the Academy.

A circular was received from Mr. Francis S. Holmes, Curator of the Museum of Natural History in the College of Charleston, dated July 1852, giving an account of the establishment of the Museum, and requesting the transmission of duplicate specimens in exchange, and the publications of the Academy; and also offering to present a specimen of a recent Crinoid from the coast of South Carolina.

The communication was referred, on motion, to the Curators.

A letter was read from the Secretary of the Linnean Society of London, dated June 23d, 1852, acknowledging the receipt of the last No.